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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,238	10/31/2003	Elbert E. Huang	YOR920030304US2 (16973)	3354

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EXAMINER	
BOOTH, RICHARD A	

ART UNIT	PAPER NUMBER
2812	

DATE MAILED: 08/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/699,238	HUANG ET AL.	
	Examiner	Art Unit	
	Richard A. Booth	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) *17-30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *0204*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of the invention of group I and the polycarbosilane species in the reply filed on 6/7/05 is acknowledged.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-6 and 8-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lopatin et al., U.S. Patent 6,893,955 in view of Apen et al., US 2003/0017635.

Lopatin et al. shows the invention substantially as claimed including an interconnect structure comprising: a buried etch stop layer 222; a via layer interlayer

dielectric 212 that is directly below said buried etch stop layer; a line level interlayer dielectric 210 that is directly above said buried etch stop layer; and conducting metal features (230,232,236) that traverse through said via level interlayer dielectric, said line level interlayer dielectric, and said buried etch stop layer.

Lopatin et al. does not expressly disclose the buried etch stop layer comprised of a polycarbosilane polymeric material.

Apen et al. discloses forming an etch stop of polycarbosilane (see paragraph 0025). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the product of Lopatin et al. so as to form the etch stop of polycarbosilane because Apen et al. shows that polycarbosilane materials are suitable for use as an etch stop in semiconductor applications.

Concerning claim 3, the examiner takes official notice that it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the polycarbosilane etch stop from one of the claimed materials because these are well known polycarbosilane materials.

Regarding claims 4-5, note that the polycarbosilane material of Apen et al. will have a dielectric constant in the claimed range depending on, for example, the porosity of the material.

Concerning claim 6, note that the etch stop can be porous (see paragraph 0025).

With respect to claim 8, note that the buried etch stop layer 220 and said via level interlayer dielectric 212 have an identical pattern.

Regarding claims 9-10, note that the buried etch stop layer of Apen et al. will be permeable to low molecular weight volatile products and is thermally stable to temperatures greater than three hundred fifty degrees Celsius.

Concerning claims 11-12, note that it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the via level and line level interlayer dielectrics of either the same or different materials based upon a variety of factors including the desired properties of each particular layer and such limitation would not lend patentabilty to the instant application absent a showing of unexpected results.

Regarding claims 13-14, the particular thickness of the buried etch stop layer and via and line level interlayer dielectric would be optimized during routine experimentation based upon a variety of factors including the desired scaling factor of the device and such limitation would not lend patentability to the instant application absent a showing of unexpected results.

With respect to claim 15, note that the conducting metal feature can be copper (see col. 6-lines 37-55).

Regarding claim 16, the barrier layer 232 can be composed of tantalum (see col. 5-lines 57-63).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lopatin et al., U.S. Patent 6,893,955 in view of Apen et al., US 2003/0017635 as applied to claims 1-6 and 8-16 above, and further in view of Cohen, US 2005/0124153.

Lopatin et al. and Apen et al. are applied as above but do not expressly disclose wherein adhesion promoters are positioned on an interface of said buried etch stop layer.

Cohen discloses an adhesion layer 18 formed so as to cover exposed inner surfaces of a via (see fig. 1 and paragraph 0025). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device of Lopatin et al. modified by Apen et al. so as to include an adhesion layer because this will allow for the adhesion of subsequently formed metallization layers.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double

patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-16 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 7-8 of U.S. Patent No. 6,803,660. Although the conflicting claims are not identical, they are not patentably distinct from each other because it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the polymeric etch stop layer as a ceramic material because this is a well known etch stop material.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A. Booth whose telephone number is (571) 272-1668. The examiner can normally be reached on Monday-Thursday from 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Richard A. Booth
Primary Examiner
Art Unit 2812

August 22, 2005